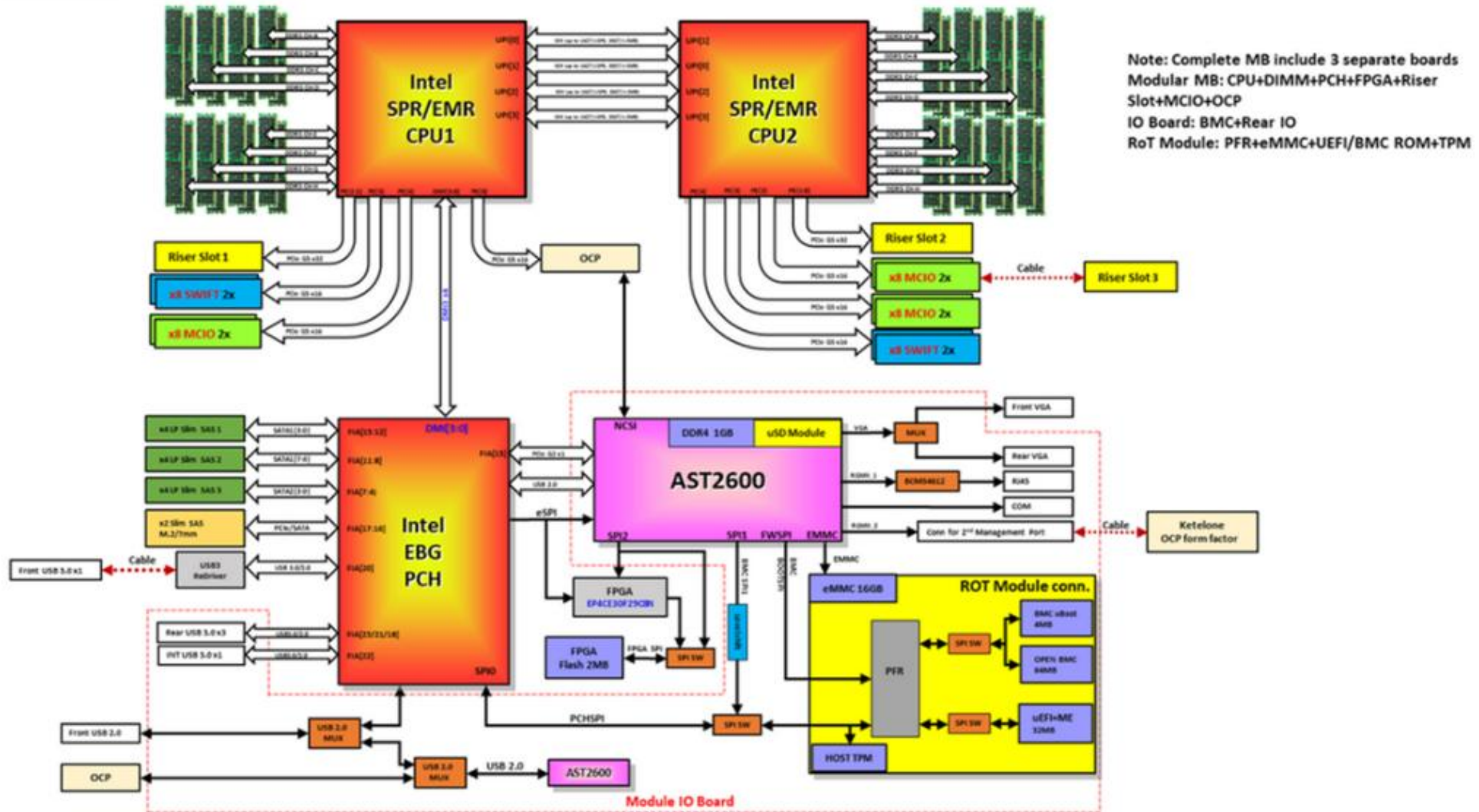


System configurations and diagrams

The SR650 V3 system block diagram and hardware configurations

Lenovo

SR650 V3 system block diagram



SR650 V3 storage adapter – compact form factor

The SR650 V3 supports the following compact form factor (CFF) storage adapters:

CFF RAID/HBA:

- 5350-8i/9350-16i PCIe 3.0 internal adapter
- 540-16i/940-16i PCIe 4.0 internal adapter
- 440-16i PCIe 4.0 internal HBA

CFF Expander:

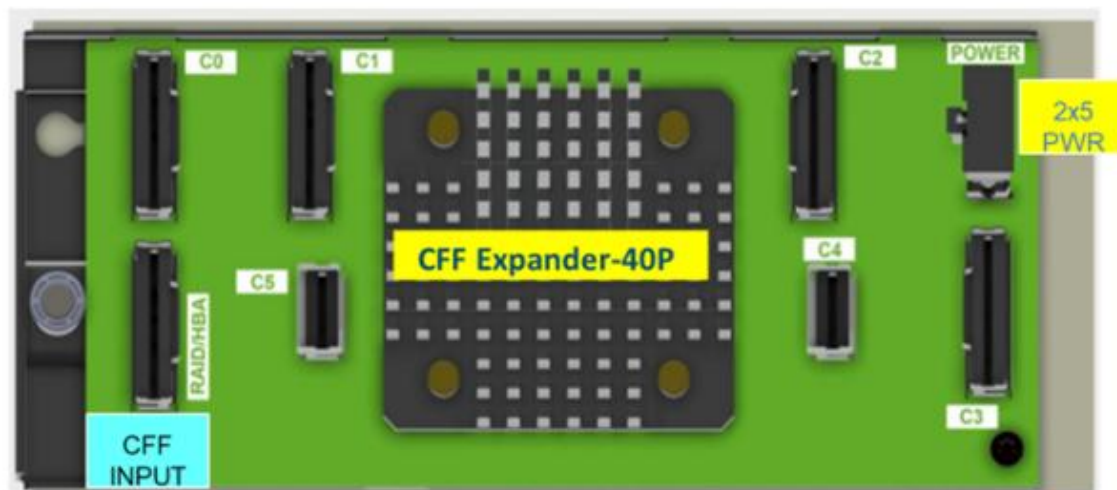
- 48 port 12 Gb internal expander



940-16i internal adapter



440-16i internal HBA



Note: The front 3.5-inch drive chassis can't support CFF RAID/HBA cards due to mechanical limitations.

SR650 V3 storage adapter – small form factor

The SR650 V3 supports the following small form factor (SFF) storage adapters:

SFF Raid/HBA

- 5350-8i/9350-8i/16i PCIe 3.0 adapter
- 540-8i/16i/940-8i/16i/32i PCIe 4.0 adapter
- 440-8i/16i PCIe 4.0 HBA



5350-8i



9350-8i



540-8i



940-16i



440-16i

SR650 V3 HDD backplane

The SR650 V3 supports the following backplanes:

Front drive bay (hot-swap)

- Four 3.5-inch AnyBay backplane
- Eight 3.5-inch SAS/SATA backplane
- 12 3.5-inch SAS/SATA backplane
- 12 3.5-inch expander backplane
- Eight 2.5-inch SAS/SATA backplane
- Eight 2.5-inch AnyBay backplane
- Eight 2.5-inch NVMe backplane
- 24 2.5-inch expander backplane

Middle drive bay (simple-swap)

- Four 3.5-inch SAS/SATA backplane
- Four 2.5-inch SAS/SATA backplane
- Four 2.5-inch NVMe backplane

Rear bay (hot-swap)

- Two 3.5-inch SAS/SATA rear backplane
- Four 3.5-inch SAS/SATA rear backplane
- Four 2.5-inch SAS/SATA rear backplane
- Four 2.5-inch Gen5 AnyBay backplane



Front 3.5-inch drive bay configurations

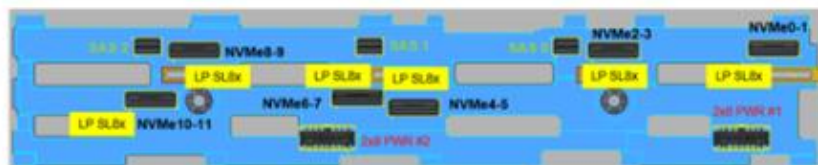
The SR650 V3 front drive bay supports the following 3.5-inch drive configurations:



Eight 3.5-inch SAS/SATA backplane



12 3.5-inch SAS/SATA backplane

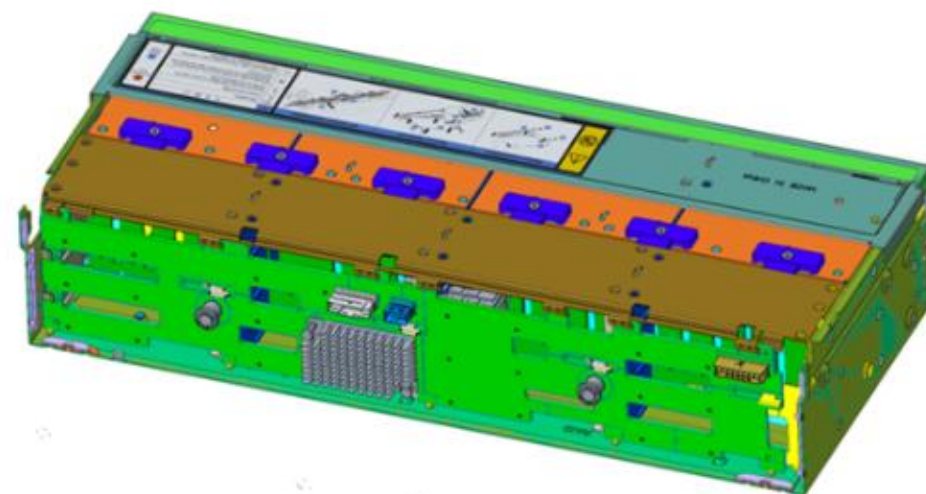
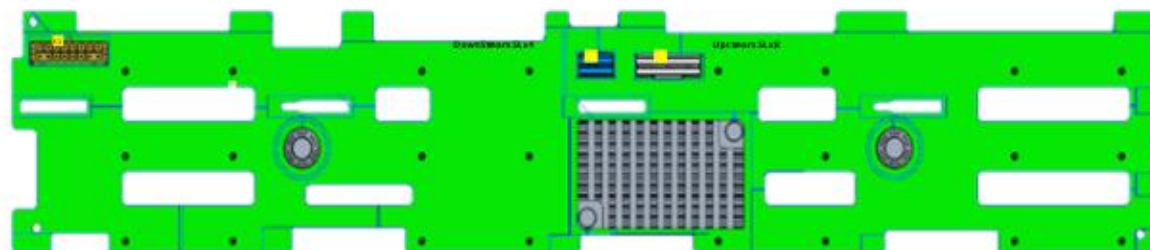


12 3.5-inch AnyBay backplane



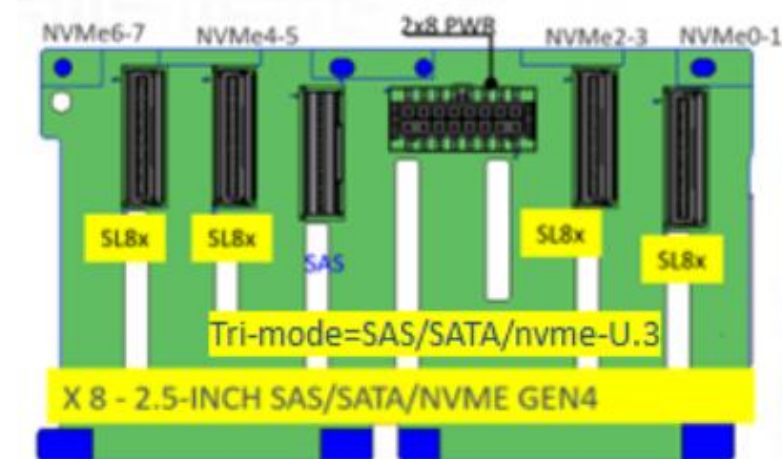
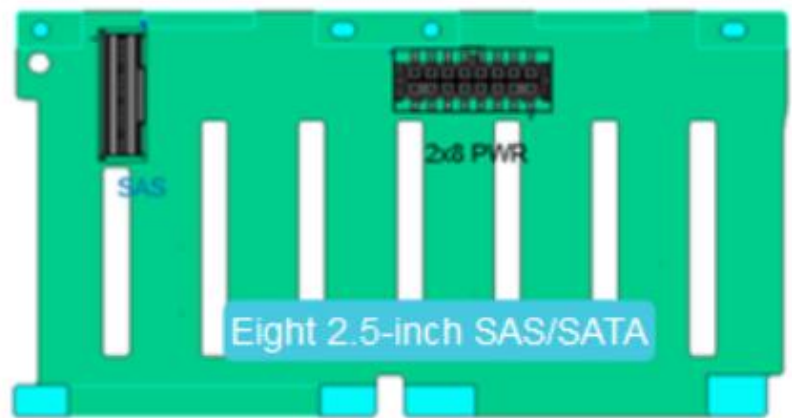
Front 3.5-inch drive bay configurations - expander backplane

The SR650 V3 can be installed with the ThinkSystem 2U 12 3.5-inch expander backplane to support 12 3.5-inch drives in the front drive bay. It has an x8 input with the signal coming from the small form factor (SFF) RAID card, and the expander on the backplane outputs a x4 SAS/SATA signal to the rear bay backplane.



Front 2.5-inch drive bay configurations – eight drives

The SR650 V3 front drive bay supports the following configurations with eight 2.5-inch drives:



Front 2.5-inch drive bay configurations – 16 drives

The SR650 V3 front drive bay supports the following configurations with 16 2.5-inch drives:



Front 2.5-inch drive configuration	Eight 2.5-inch SAS/SATA backplane	Eight 2.5-inch AnyBay backplane	Eight 2.5-inch NVMe backplane
16 SAS/SATA	BP1 + BP2		
16 AnyBay (including U.3)		BP1 + BP2	
16 NVMe (CPU2 is required)			BP1 + BP2
8 AnyBay + 8 NVMe (CPU2 is required)		BP1	BP2
8 SAS/SATA + 8 AnyBay	BP1	BP2	
8 SAS/SATA + 8 NVMe	BP1		BP2

Note: The AnyBay backplane with a RAID 940 series adapter can support Tri-Mode and U.3 drives.

Front 2.5-inch drive bay configurations – 24 drives

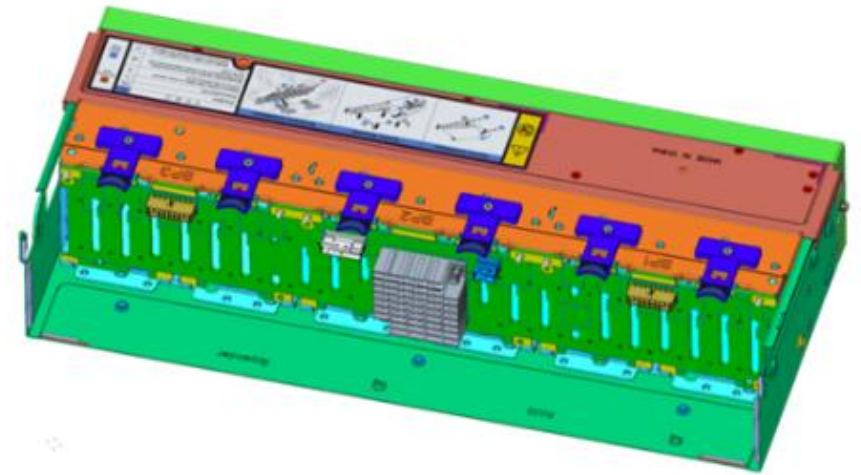
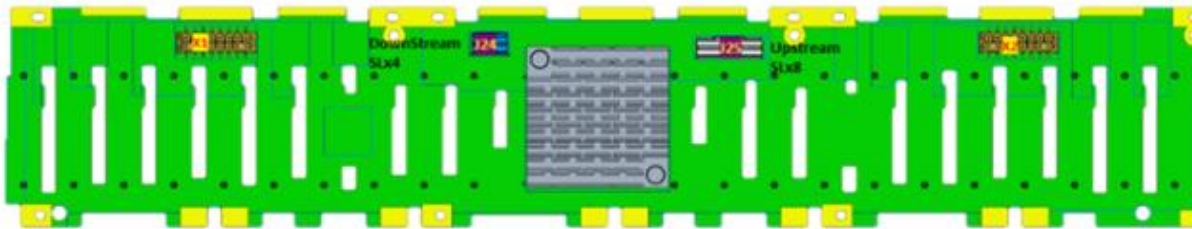
The SR650 V3 front drive bay supports the following configurations with 24 2.5-inch drives:



Front 2.5-inch drive configuration	Eight 2.5-inch SAS/SATA backplane	Eight 2.5-inch AnyBay backplane	Eight 2.5-inch NVMe backplane
24 SAS/SATA	BP1 + BP2 + BP3		
24 NVMe (CPU2 is required)			BP1 + BP2 + BP3
24 AnyBay (CPU2 is required)		BP1 + BP2 + BP3	
16 SAS/SATA + 8 AnyBay	BP1 + BP2	BP3	
16 SAS/SATA + 8 NVMe	BP1 + BP2		BP3
8 SAS/SATA + 16 NVMe (CPU2 is required)	BP1		BP2 + BP3
8 SAS/SATA + 16 AnyBay	BP1	BP2 + BP3	

Front 2.5-inch drive bay configurations - expander backplane

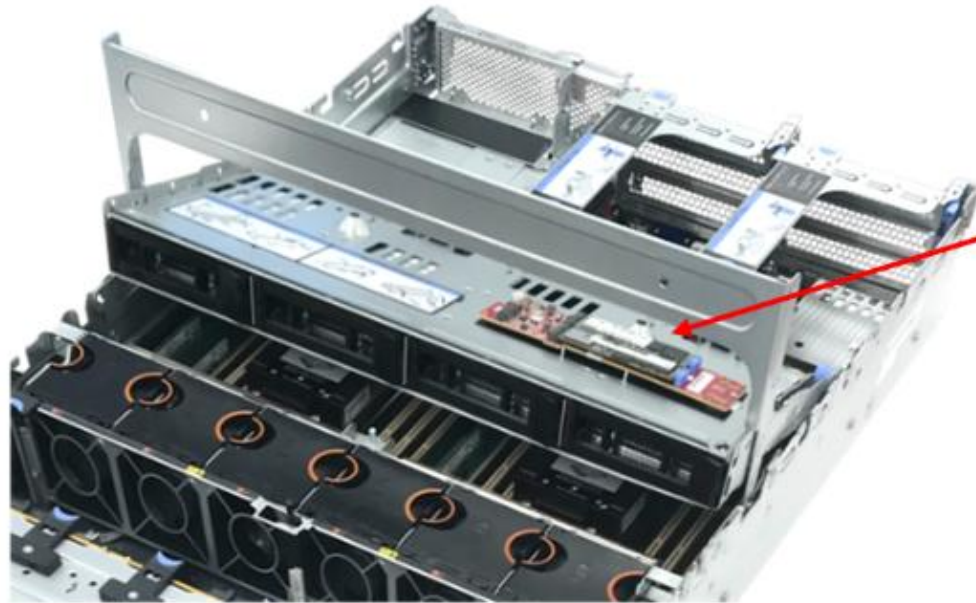
The SR650 V3 can be installed with the ThinkSystem 2U 24 2.5-inch expander backplane to support 24 2.5-inch drives in the front drive bay. It has an x8 input with the signal coming from the small form factor (SFF) or compact form factor (CFF) RAID card, and the expander on the backplane outputs a x4 SAS/SATA signal to the rear bay backplane.



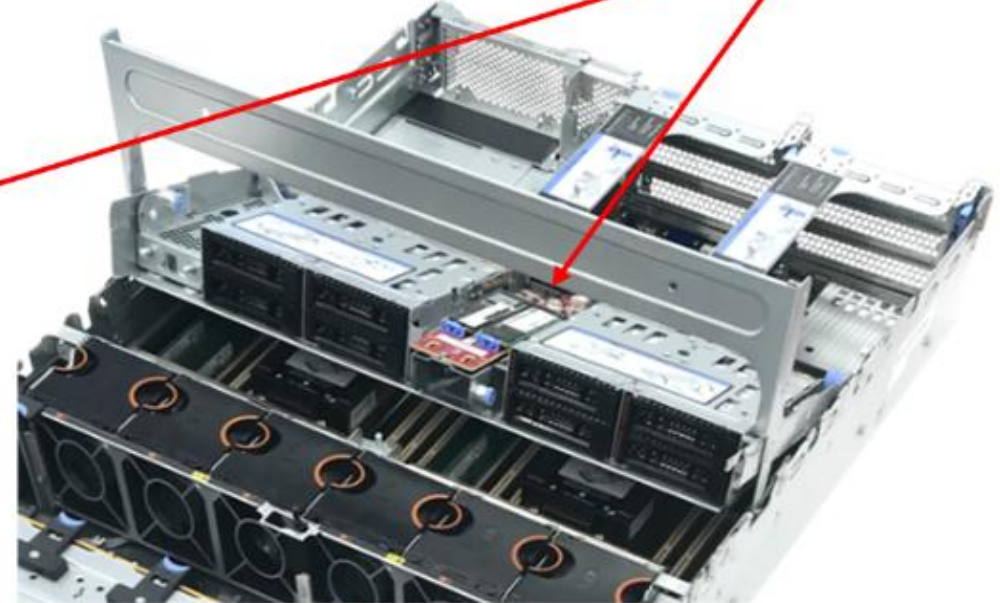
Middle drive bay configurations

The SR650 V3 middle drive bay supports the following configurations:

- Four 3.5-inch hot-swap SAS/SATA drive bays
- Eight 2.5-inch hot-swap SAS/SATA drive bays
- Eight 2.5-inch hot-swap NVMe drive bays



Four 3.5-inch mid-chassis hot-swap drive bays



Eight 2.5-inch mid-chassis hot-swap drive bays

M.2 adapter with
two M.2 drives

Note: The 2.5-inch front drive chassis does not support the 3.5-inch middle drive bay due to space limitations.

Rear drive bay configurations

The SR650 V3 rear drive bay supports the following configurations:

- 3.5-inch hot-swap drives
 - Two SAS/SATA drive bays
 - Four SAS/SATA drive bays
- 2.5-inch hot-swap drives
 - Four SAS/SATA drive bays
 - Eight SAS/SATA drive bays

Two 3.5-inch SAS/SATA drives



Four 3.5-inch SAS/SATA drives



Eight 2.5-inch SAS/SATA drives



Four 2.5-inch SAS/SATA drives



Note: The 2.5-inch front drive chassis does not support the 3.5-inch rear drive bay due to space limitations.

Rear 7 mm SATA or NVMe drive bay configurations

The SR650 V3 supports two 7 mm drives installed in either slot 3 or slot 6.

- Two 7 mm SATA hot-swap drive bays
- Two 7 mm NVMe hot-swap drive bays

Two 7 mm SATA or NVMe hot-swap
drive bays (slot 3)

Alternative location (slot 6)



I/O expansion slot configuration – eight PCIe slots

The SR650 V3 can be installed with three riser cards to support up to eight full-height full-length (FHFL) form factor PCIe 4.0 slots and a dedicated OCP 3.0 SFF slot for networking. To use slots 4 to 6, both processors must be installed.

- Riser 1: slots 1, 2, and 3 (CPU 1)
- Riser 2: slots 4, 5, and 6 (CPU 2)
- Riser 3: slot 7 and slot 8
 - With 2 CPUs installed, slot 7 connects to CPU 1 and slot 8 to CPU 2
 - With 1 CPU installed, slots 7 and 8 both connect to CPU 1



SR650 V3 storage adapter – compact form factor

The SR650 V3 can be installed with four riser cards to support up to 10 PCIe 4.0 slots. Slots 1 to 6 support FHFL form factor PCIe adapters, and slots 7 to 10 support Low-Profile (LP) form factor PCIe adapters.

- Riser 1: slots 1, 2, and 3 (CPU 1)
- Riser 2: slots 4, 5, and 6 (CPU 2)
- Riser 3: slots 7 and 8 (CPU 2)
- Riser 4: slots 9 and 10 (CPU 2)



RAID flash power module and M.2 drive location

The location of the RAID flash power modules (supercaps) and M.2 drives depends on the middle drive bay used in the server. See the following table for more information:

Middle drive bay	Supercaps supported	Location of supercaps	Location of M.2
No middle drive bay	4	Mounted on the air baffle	Mounted on the air baffle
2.5-inch middle drive bay	2	Mounted on the left side of the middle drive bay	Mounted on the center of the middle drive bay
3.5-inch middle drive bay	1	Mounted under the system fan cage	Mounted on the top of the middle drive bay

Click [HERE](#) to see the supercap and M.2 drive locations.

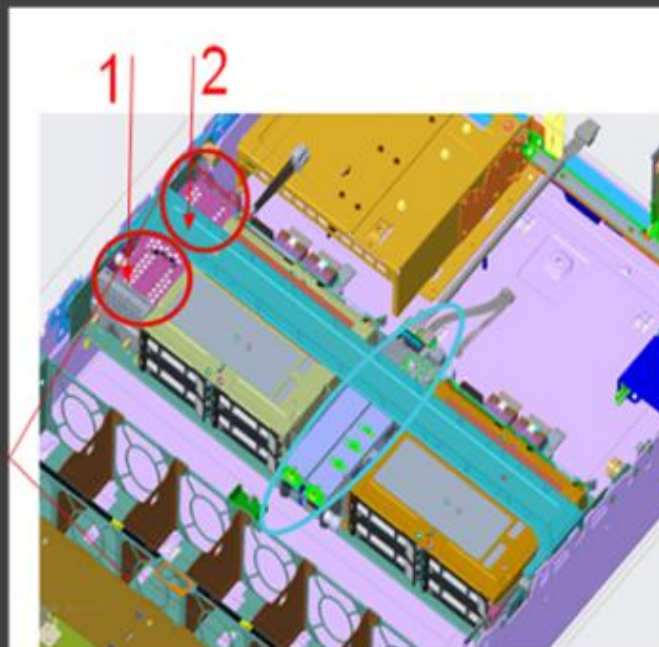


○ : Supercap

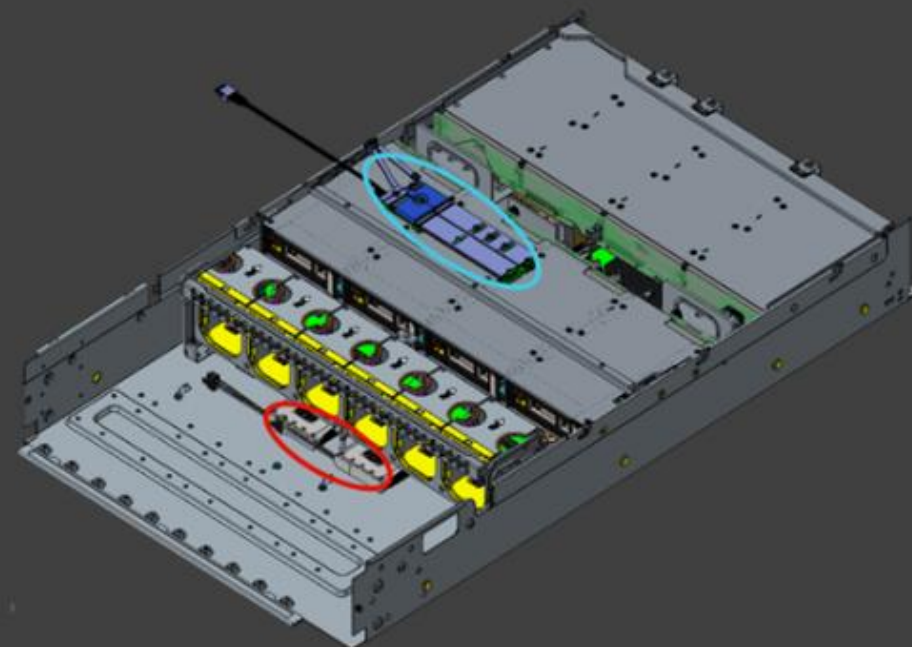
○ : M.2



Mounted on the main air baffle or GPU air baffle



Mounted on the left side of the middle drive bay



Mounted under the system fan cage

GPU adapters

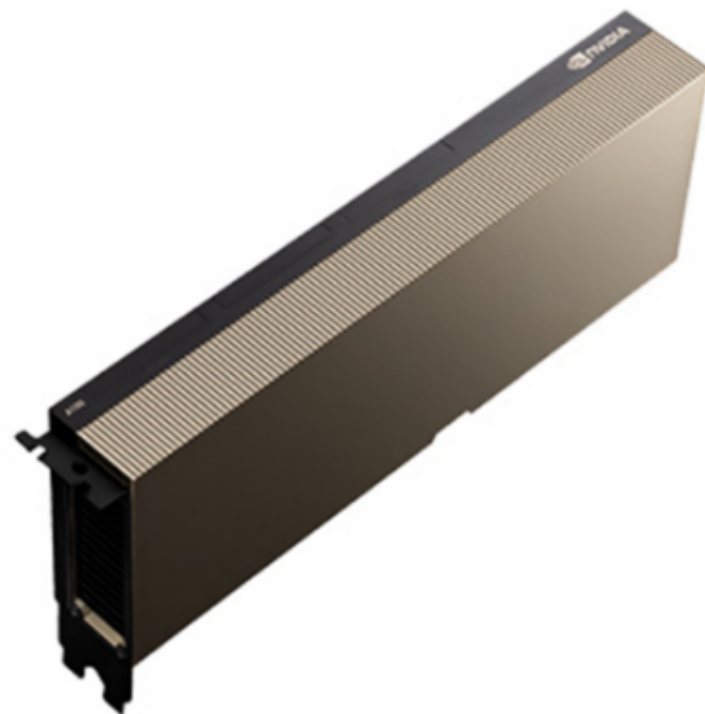
When both processors are installed, the SR650 V3 supports the following GPUs in PCIe slots:

- Three double-width (DW) GPUs with limitations (maximum 350 W, NVIDIA H100)
 - The NVIDIA H100 is not supported in PRC (China) – the NVIDIA A800 will be used in China
- Six single-width (SW) GPUs (150 W)
- Eight single-width GPUs (75 W)

Note: Due to thermal limitations, GPUs are not supported if a middle drive bay or rear drive bay is installed in the system.

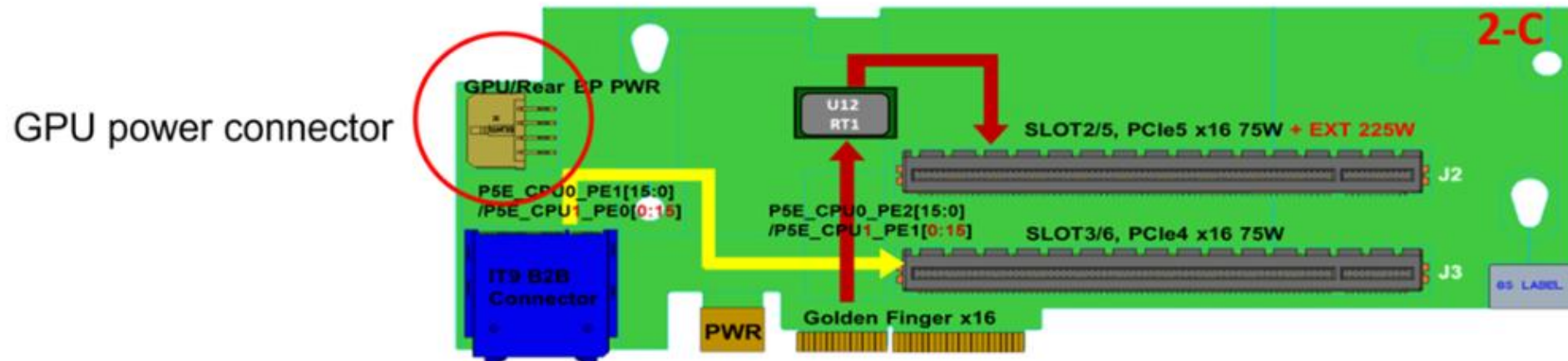
Note:

- For a full list of supported GPUs, refer to the [ThinkSystem GPU Summary](#)
- For detailed configuration rules of PCIe slots and PCIe adapters, refer to the [Technical rules section](#) in the ThinkSystem SR650 V3 setup guide



DW GPUs in the configuration

The SR650 V3 supports three DW GPUs. They can only be installed in slots 2, 5, and 7, and each riser has only one external power connector for the DW 350 W GPU.



Memory options

The SR650 V3 supports 16 DIMMs per processor. Each processor has eight memory channels with two DIMMs per channel (2DPC). There is support for 1DPC at 4800 MHZ and 2DPC at 4400 MHZ.

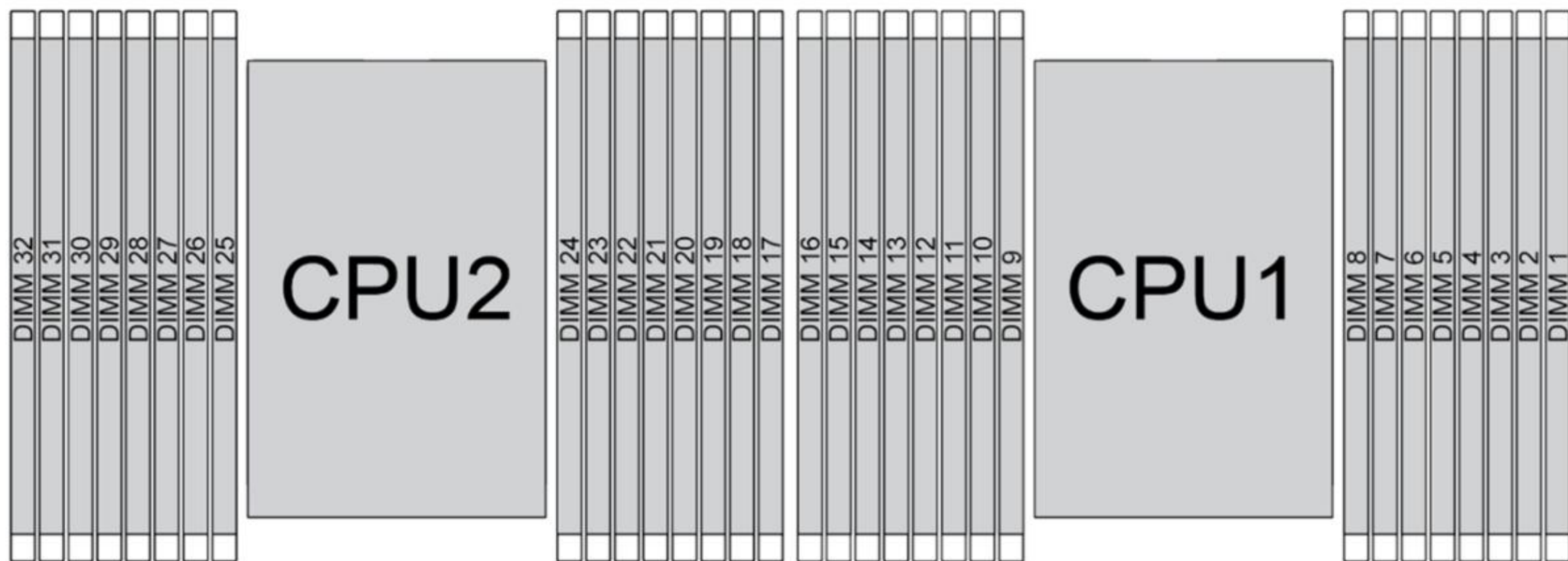
The SR650 V3 supports two memory modes:

- Independent memory mode
- Memory mirroring mode

Note: For detailed memory configuration and installation rules, refer to the [Memory module installation rules and order](#) section of the SR650 V3 Setup Guide.

Memory slot and channel identification

The following figure shows layout of the memory modules and processors. Click [HERE](#) to see the memory slot and channel identification.



Server front

Memory slot and channel identification



Processor	CPU 1															
Controller	iMC3				iMC2				iMC0				iMC1			
Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM No.	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Processor	CPU 2															
Controller	iMC3				iMC2				iMC0				iMC1			
Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM No.	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

M.2 and 7 mm drive boot solution configurations

The SR650 V3 supports one or two M.2 or 7 mm SATA or NVMe drives for use as an operating system boot solution or as additional storage.

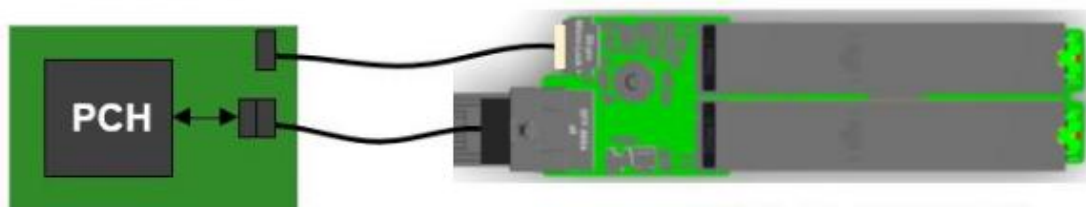
Configuration notes:

- RAID support is implemented using VROC (no adapter needed) or with the use of an additional RAID adapter.
- If RAID is enabled using VROC, use the following features:
 - VROC SATA support: Onboard SATA software RAID mode for 7 mm drives
 - VROC NVMe support: Intel VROC (VMD NVMe RAID) standard for 7 mm drives
- If RAID is enabled using a RAID adapter, the adapter must be installed in PCIe slot 1 or 2
 - RAID support for 7 mm SATA drives requires a RAID 5350-8i adapter
 - RAID support for 7 mm NVMe drives requires a RAID 540-8i adapter operating in Tri-Mode
- RAID can be enabled using an M.2 or 7 mm adapter through an onboard Marvell controller.
- M.2 and 7 mm drives are not supported together in the same configuration.

M.2 boot solution configurations

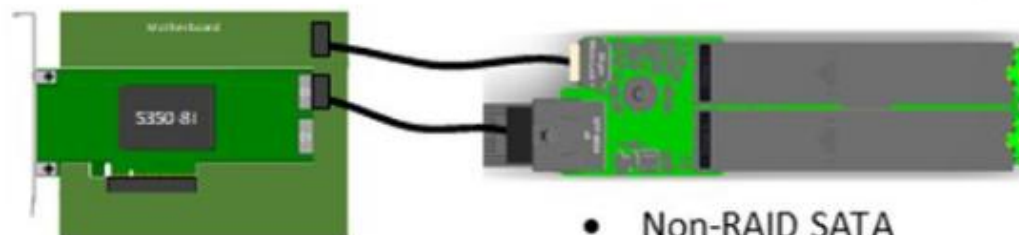
The following figures show M.2 drives connected either to the system board or to a RAID adapter. Note that different configurations use different cables. Refer to [Lenovo Docs](#) for more information.

- SATA Boot



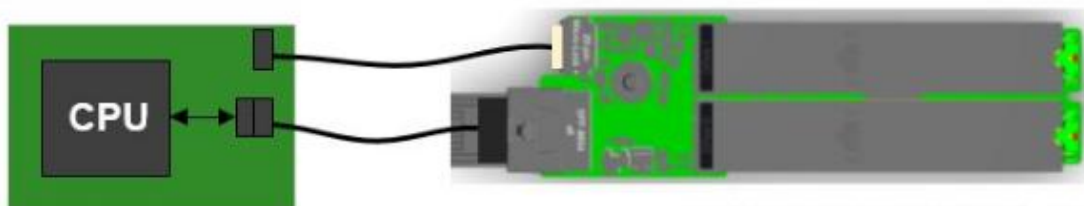
- SATA RAID (VROC)
- Non-RAID SATA

- Hardware RAID (SFF/CFF 5350-8i SATA RAID)



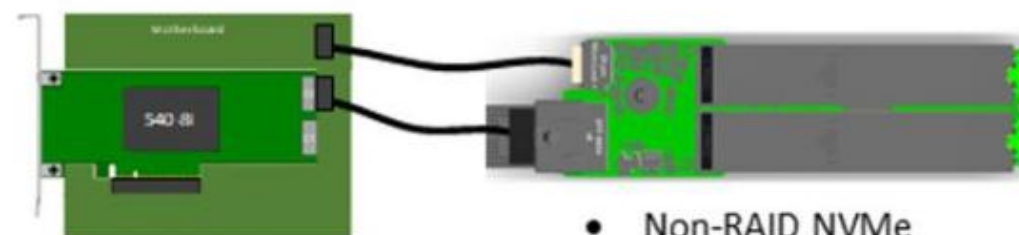
- Non-RAID SATA

- NVMe Boot (CPU attached)



- NVMe RAID (VROC standard)
- Non-RAID NVMe

- Hardware RAID (SFF 540-8i NVMe RAID)



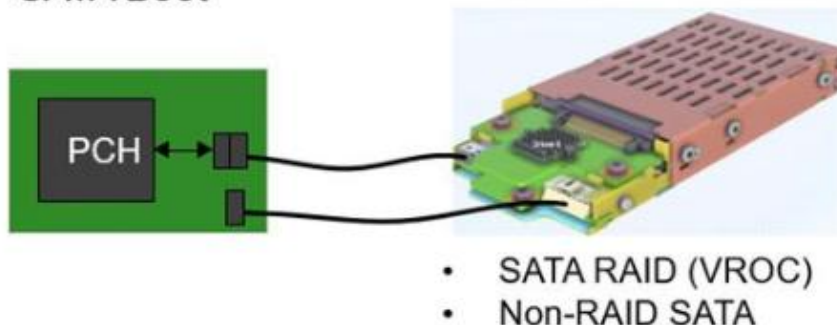
- Non-RAID NVMe
- NVMe RAID

Note: For the latest lists of supported M.2 drives and adapters, refer to the [Lenovo Press product guide](#).

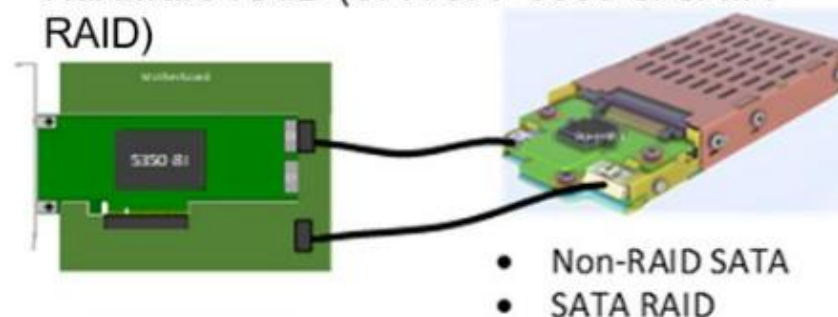
7 mm boot solution configurations

The following figures show 7 mm drives connected either to the system board or to a RAID adapter. Note that different configurations use different cables. Refer to [Lenovo Docs](#) for more information.

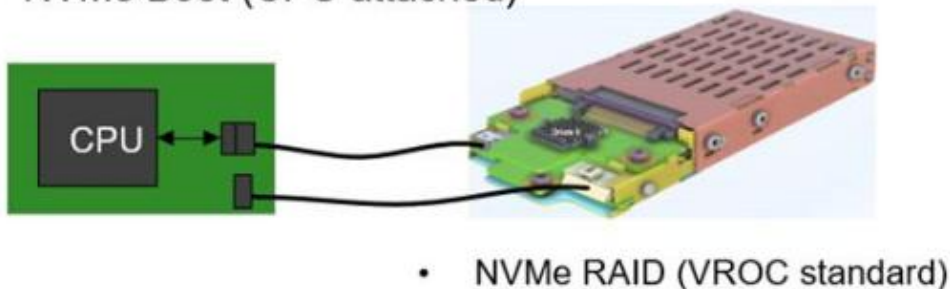
- SATA Boot



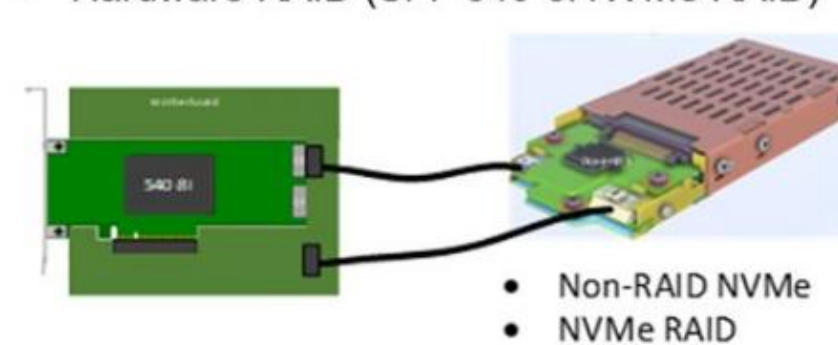
- Hardware RAID (SFF/CFF 5350-8i SATA RAID)



- NVMe Boot (CPU attached)



- Hardware RAID (SFF 540-8i NVMe RAID)

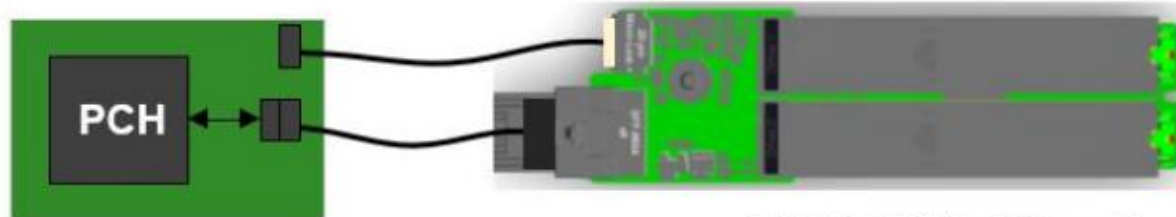


Note: For the latest list of supported 7 mm drives and RAID adapters, refer to the [Lenovo Press product guide](#).

M.2 or 7 mm boot solution configurations with a Marvell controller

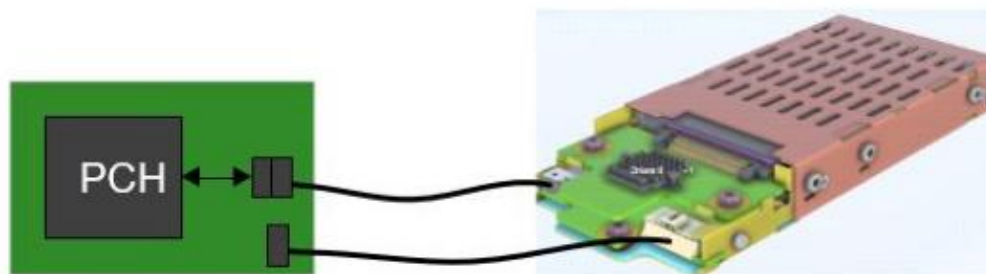
The following figures show M.2 or 7 mm drives with a Marvell controller connected to the system board for hardware RAID. Note that different configurations use different cables. Refer to [Lenovo Docs](#) for more information.

- M.2 NVMe Boot



- NVMe RAID (Marvell controller)

- 7 mm NVMe Boot



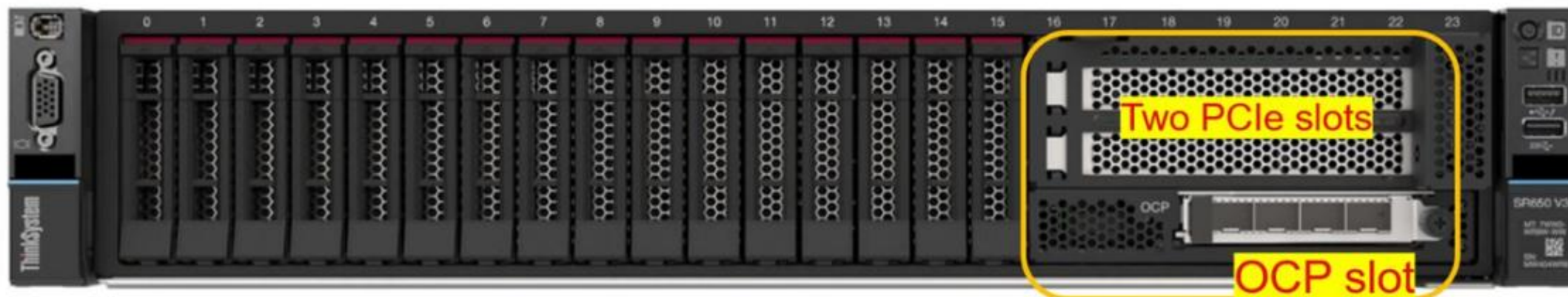
- NVMe RAID (Marvell controller)

Front adapter cage

The SR650 V3 supports a front adapter cage, which includes two front-accessible PCIe slots plus a dedicated OCP 3.0 SFF slot for networking.

Front-accessible slots:

- Slot 11: PCIe 4.0 x16 FHHL (connects to CPU 2)
- Slot 12: PCIe 4.0 x16 FHHL (connects to CPU 1)



Front adapter cage

Front adapter cage components

The front adapter cage has the following components:



Front adapter cage



Riser cage with riser card



Bottom cage with front OCP interposer card

Front riser card and front OCP interposer card

Front OCP interposer card

Top view



Rear view

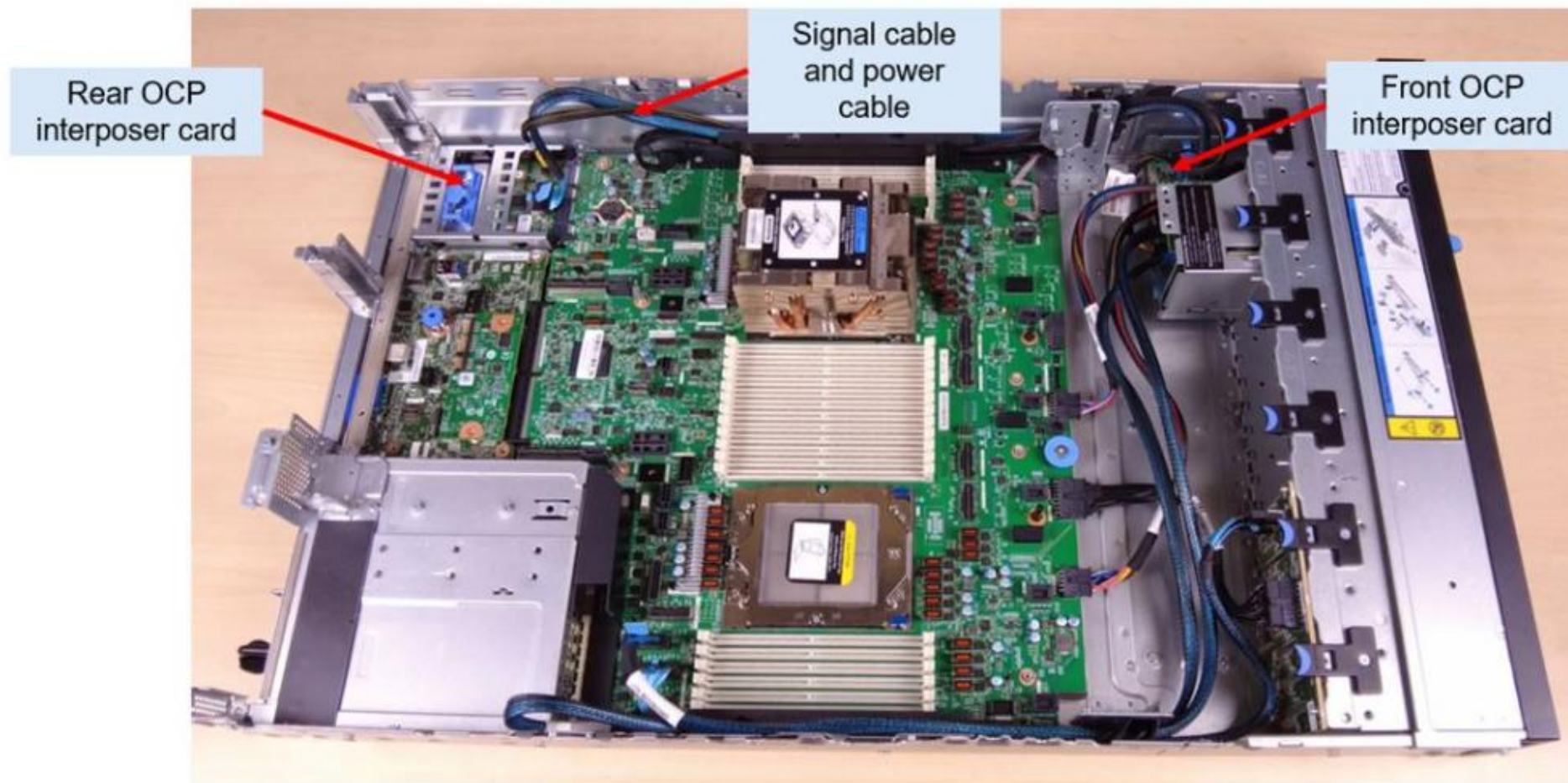


Front riser card



Rear OCP interposer card

The rear OCP adapter is installed in the rear OCP slot and is connected to cables to pass the signal and power to the front OCP interposer card, which means that an OCP adapter can be installed in the front.



Rear OCP interposer card location

These figures show the rear OCP interposer card before and after being installed in the rear OCP slot.

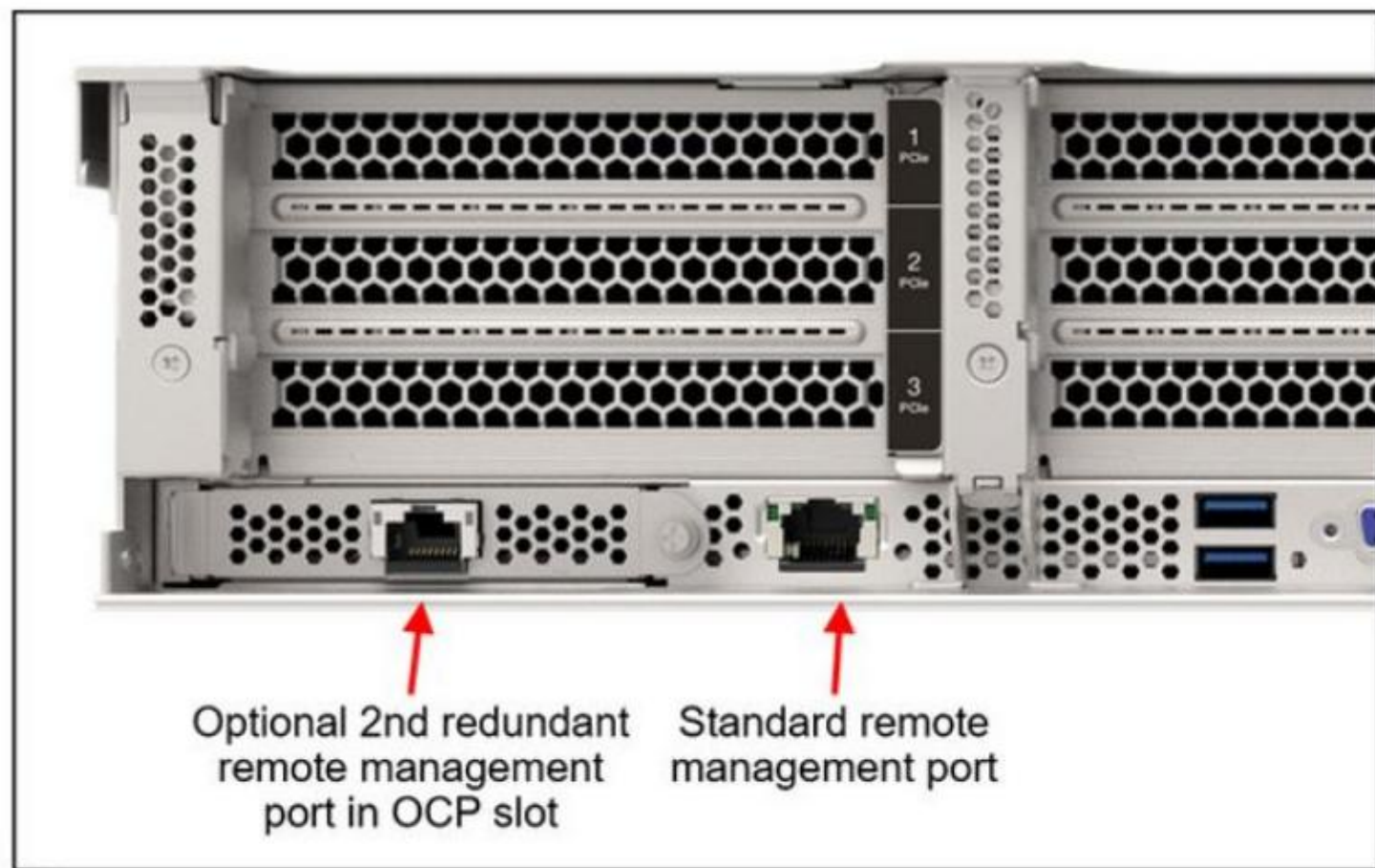


Management NIC adapter

The use of this adapter allows for concurrent remote access using both the connection on the adapter and the onboard RJ45 (XCC) remote management port provided by the server. The adapter and onboard port have separate IP addresses.

Configuration rules:

- The management NIC adapter is installed in the OCP adapter slot at the rear of the server and cannot be used with any OCP network adapter.
- The management NIC adapter cannot be installed in the front OCP slot (if the front OCP slot is configured).
- If the management NIC adapter is installed in the rear slot, then the front OCP slot (if configured) cannot be used.



2.5-inch chassis with front adapter cage configurations

The SR650 V3 2.5-inch chassis with front adapter cage support various configurations. Refer to the *Drive bay field upgrades - 2.5-inch chassis with front slots* section on the [Lenovo ThinkSystem SR650 V3 Product Guide](#) for more information.

Drive bay field upgrades - 2.5-inch chassis with front slots

The tables below lists the backplane kits and cable kits needed to build one of the supported 2.5-inch chassis configurations with front and rear.

The Config numbers listed here match the configuration listed in the Storage configuration [Overview](#) and [Details](#) sections.

Return to [Field upgrades](#).

Table 35. Drive bay field upgrades for the 2.5-inch chassis with front PCIe slots (Blue = SAS/SATA, Purple = AnyBay, Red = NVMe)

Config	2.5" front bays				Mid bays			Rear bays				Backplane and cable kits required (all required)
	SAS/ SATA	Any Bay	NVMe	Tri- Mode	3.5" SAS	2.5" SAS	2.5" NVMe	3.5" SAS	2.5" SAS	2.5" NVMe	2.5" Any	
31	8	0	0	0	0	0	0	0	0	0	0	<ul style="list-style-type: none">• 4XH7A60930, ThinkSystem V3 2U 8x2.5" SAS/SATA Backplane Option Kit• 4X97A82933, ThinkSystem SR650 V3 2.5" Chassis Front BP1 SAS/SATA Cable Kit
32	0	8	0	0	0	0	0	0	0	0	0	<ul style="list-style-type: none">• 4XH7A82913, ThinkSystem SR650 V3 8x2.5" AnyBay Backplane Option Kit• 4X97A82933, ThinkSystem SR650 V3 2.5" Chassis Front BP1 SAS/SATA Cable Kit